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WELLCOME HISTORY OF MEDICINE ESSAY: 1970

BLEEDING: ITS USES FROM THE EIGHTEENTH CENTURY TO THE TWENTIETH CENTURY

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"Bleeding" is a general term which can be interpreted to include:

Arteriotomy (Arteriotomia- the cutting open of an aftery)

Venesection (Venesectio - the cutting open of a vein) also known as Phlebotomy.

Leeching (the drawing of blood by the application of leeches)

Wet Cupping (see text)

Scarification (the making of superficial and small incisions)

All these techniques have been in use during the last three hundred years for the purpose of withdrawing blood, but with varying therapeutic principles in mind.

It is the intriguing history of the changing uses and theories and uses of bleeding that, in a primarily chronological fashion, will be described.

Leeching was as popular in the eighteenth centuryas it had been for the previous two centuries.Very little was added to the subject either in technique or usage, so many of the traditional uses prevailed.

For instance, in a case of headache, ten leeches werew applied in a circle on each temple. To treat retention of the menses, four leeches were fastened to a thrwad, and applied as closejy as possible to the uterus. Obesity called for leeching all over the body.

There was, in fact, no disease existing that did not benefit from leeching of the anus- especially epistaxis, haemoptysis, and haematemesis (1)

Richard Mead of Edinburgh wrote in 1775, that he found leeching to be of vast service in delirium, and he used leeches in fevers if the patient was too weak to bleed. (1)

The first mention of leeches in the records of the Manchester Infirmary (to take but one example) was in 1782. By 1791, the Infirmary ordered "that a sufficient quantity of leeches shall be kept in the Infirmary, and that the Apothecary take care of this order" (1)

Leeches were universally applied for many disorders. Great value was laid on snipping off the tail of the leech: this way one leech acted as several, because it continued to draw blood as the fluid just dripped out from the wounded tail.

Wet Cupping, another traditional form of bleeding, was described in detail by Heister in 1750. A cup, (preferably of glass, so that the procedure could be observed) was taken, and a lighted tow thrown in toexpel the air.

The cup was applied to the skin, open-end down, and still hot. As the air in the cup cooled, skin was drawn into the cup by a partial vacuum effect. To draw blood, the skin was first scarified at the point at which the cup was to be applied, so that when the skin was drawn into the cup, blood oozed out.

With some operators, wet cupping was an energetic procedure; while some cups were filled with blood, other areas of skin were scarified. Blood was poured into a pan, and the glasses washed, ready for the whole procedure to be repeated.

There were sophistications of this technique: Heister used a mechanical scarificator which consisted of sixteen small blades fixed in a cubical brass box with a steel spring. When it was set on the skin, and a button depressed, the blades made sixteen regular cuts at the point where the cup was about to be placed .

Other methods, such as using a torch to heat the cup (and thus avoiding burning the skin with a tow), and using an exhausting syringe to withdraw air, proved difficult to use.

Heister used his machine for many diseases: he was a firm believer in the principle of revulsions, so he cupped at some distance from the seat of the disease. For example, in severe haemorrhage of the nose of lungs, he scarified the legs or feet. He admitted that some people found the procedure both useless and dangerous.

Richard Mead treated apoplexy by cupping the neck with deep scarifications. For the "Iliac Passion", a diagnosis which probably embraced several acute abdominal emergencies including appendicitis, he used slight scarification around the navel.

In 1788, John Huxham strongly advised wet cupping in any feverish disorder such as pneumonia: also for any menstrual disorders or asthma.

M. Demours, Napoleon's famous army surgeon, invented a machine called the "Artificial Leech". To operate it , the cup was applied and air evacuated by means of a syringe; when the skin had risen well into the cup, a lancet was thrust in the skin to whatever depth was required, and a free flow of blood obtained. (1)

General blood letting by phebotomy was practised widely to treat supposedly systemic disorders.

William Cullen (1710-90), founder of Edinburgh Medical School thought that fever diminished the energy of the brain and nerves to induce a "cold fit" whereupon the "vis Mediatfix naturae" reacted by producing a spasm of smaller arteries, and thus a "hot fit". He therefore used restoratives to treat a cold fit, and bleeding with purging to reduce the nervous energy in cases of hot fits. ie: "feed a cold, and Starve a fever"

A pupil of Cullen's, John Brown (1735-88), originated the "Brunonian" system in Britain and Italy. The theory of this system was that life is maintained by constant stimuli: every deviation from the normal stimulus is a disproportion of stimulus. If the stimulus is too strong, then the state is "sthenic": if too weak, the state is "asthenic" or "typhus". Diagnosis depended mainly on the pulse and the temperature: if the patient was in a sthenic state with a bounding pulse, then bleeding was indicated.

In Italy, Rasori was the chief exponent of the Brunonian system: he abandoned the system Brown had suggested, and substituted the diatheses of stimulation and counter-stimulation. Blood-letting was always a sure way of confirming the diagnosis because if the diathesis of counter-stimulation was present , the patient always improved after bleeding! For syphilis, Rasori prescribed blood-letting of 4,230grams with 4 or 5 grams of antimony, -disastrous results ensued.

Cullen bled patients to the point of fainting as the main cure in pneumonia: for tuberculosis, he used bleeding and a sparse vegetarian diet: for jaundice (taken to be a sign of gallstones) patients were bled "to relax the tension of the biliary duct", and caused to vomit to force the stones out under pressure. (3)

By Referral to many books of History of Medicine, confirmation that blood-letting was commonly practised in the eighteenth century. Cockburn, a Naval physician, maintained phlebotomy as "a cure for most ills".William Northcote, in his "The Marine Practice of Physic and Surgery" tells how the fever is cured by phlebotomy "the most ancient, effectual and extentsive remedy on most occasions" (4)

Even at that time, there were a few dissenters: Gillespie accused Doctors ships of heavy loss of life in the Yellow Fever outbreak of 1793 in Antigua, due to the"drastic and unnatural practice" of bleeding, which was advocated by fever experts such as Dr Benjamin Rush of America, and Dr Moseley, the military surgeon and friend of Nelson. (4)

The beginning of the nineteenth century saw an upward surge in the pop -ularity of bleeding.

Until the 40's to 50's of that century, bleeding was used indiscrimin -ately. Normal healthy people came to be bled in the Spring and Autumn of every year, in the belief that bleeding helped maintain health. People were often seen lying on the floor, having died or fainted from loss of blood.

Every disease was treated by venesection, from the last stages of typhoid fever, to women dying from haemorrhage in childbirth.

In FRance, the pupils of Broussais continued to practise as widely as in Britain. One pupil, Bouillard,(1796-1881) was the last great blood-letter. He thought that the physician should dominate nature, and not

merely assist. His favorite remedy was to apply leeches to the stomach or to the head, with the aim of preventing or curing gastro-enteritis. Enormous numbers of leeches were imported into Paris in the early nineteenth century when bleeding was so in voque.

Leeching was then a substantial trade centering on France: five varieties of Hirundo medicinalis were known. Demand outstripped supply, so they were imported eg: from the collecting point Strasbourg, 60-80,000 leeches were sent daily to Paris at the most popular time from 1827-1844.

In 1824, England received 5 million leeches; in 1846, a single leech cost between 1s 6d and 1s.2d! It was estimated that one leech weighing 3 drachms sucked 3 drachms and one scruple of blood, and a further 3½ drachms escaped from the wound. Thus, the size of the leech was important. (1)

In 1803, Chapman recommended bleeding widely- not just for gastritis,(13) but copiously for eclampsia, for example. A typical example of how bleeding was incorporated with other therapeutic measures, is given by Lettson in 1815 (I) He records the case of a patient who had suddenly become delirious and unconscious: firstly, his head was shaved and a cold application was given. If this had no effect, then he resorted to cupping and leeching which, if they were ineffective, were followed bycathartics and blistering. This particularly lucky patient recovered after four days!

Examples of cases considered suitable for treatment by leeching were numerous at that time: leeches were applied to to the stomach in whooping cough, or in any cold when the patient almost suffocated from phlegm. For removing the reproachful appearance of a black-eye, leeches were superb; in any fever, teething trouble, or convulsions, children were frequently leeched behind the ears, in the hope that blood would be drawn away from the brain.

The technique of leeching had altered very little, except in. refinements. For example, application was now done by inverting a wine glass full of them onto the skin, and as well as continuing the habit of tail snipping to increase the sucking power of one leech, the beasts were rubbed with salt until they vomited, and then reapplied.
If they refused to bite, the skin was scratched first; to make them drop off, they were rubbed with salt or snuff. Care was taken to ensure that leeches did not crawl into the throat and get swallowed, by tying a thread through the tail.

Leeches had now become so much in demand that the Manchester Infirmary bought a set of glass leeches and scarificators, to reduce the expenditure on leeching, in 1828.

Cupping persisted throughout the nineteenth century, but was apt to be relegated to bath attendants and specially trained cuppers.

Samuel Bayfield, in 1823, gave a long and eulogistic list of areas of the body suitable for cupping with scarification, together with a clear account of the practical details of cupping. He pointed out that the lancet had to be sharp, and the risk of suppuration was high.

Dr. Marshall Hall, of St. Thomas's hospital, described a refinement of wet cupping where very little blood was drawn, but the incisions became inflammed, and thus induced counter- irritation(the theory of counter-irritation was also in vogue at this time)

The principles of bleeding had, by the mid nineteenth century, been accepted into surgery, as Chelius showed in his book "Surgery" (1847) (10) Here, he classified blood-letting into general bleeding (venesection and arteriotomy) and localized bleeding (leeching, scarification, and cupping) He gave a lucid description of the techniques involved: arteriotomy was only performed onthe temporal artery for severe inflammations of important organs such as the brain or the eye, when much blood needed to be evacuated quickly. To perform the operation, the pulse had to be located then a skin flap cut, and the artery found. The artery was then opened obliquely. When sufficient blood had been taken, the artery was cut through and tied off. The skin was closed with sticking plaster.The effects of arteriotomy were only transitory because anastomoses quickly developed; also the vessel could only be used once since it was tied off afterwards. There was also the risk of aneurysm and continued bleeding.

Chelius performed scarification bymaking deep or shallow cuts by a lancet or bistoury: it was used wherever leeches could not be put, as on an inflammed tongue, gums or tonsils. The conjunctiva were often scarified after acute inflammation had subsided. Scarification was also used to relieve tension caused by inflammatory swelling over unyielding aponeuroses

Cupping was preferred over leeching in any chronic deep seated inflammation (specially rheumatic or arthritic) because of the powerful derivation to the skin(ie: irritation), which was considered useful in lumbago or sciatica. Others disagreed with Chelius, and said that leeching produced more irritation.

Chelius's work shows how these ancient remedies had been incorporated and accepted into the rapidly developing speciality of surgery, but with no real change in their mode of use.

(11) It is interesting to find that Wardrop in his book "On Blood-letting: an account of the curative effects of the abstraction of blood", which was published in 1835, attempts to bring an element of discrimination into the uses of bleeding, by enumerating the criteria on which the decision to bleed was made. For Wardrop,an incompressible pulse was always to be treated by phlebotomy as were wiry, hard, full or oppressed pulses; the frequency

of the pulse did not matter. The presence of fever of the tumultuous action of the heart were also strong indications, Local pain was only to be treated by phleboto-myuntil the febrile excitement had been subdued.

Wardrop considered the first bleed to be most important in stopping inflammatory disease, and more effective than several large bleeds. He used one bleed of 40 ounzes, rather than three bleeds of 20 ounzes each. This way, he saved on the amount of blood taken off- this is the first indication found that blood loss was considered harmful.

Wardrop also distinquished between the quantity of blood taken, and the effects of bleeding. 1835 was in the pre-anaesthetic efa, so he suggested bleeding to syncope as a method of inducing unconsciousness for reducing a strangulated hernia or a dislocated hip, or doing some other painful manipulation. To bring syncope on as rapidly as possible, with as little blood loss as could be managed, the patient was bled in an upright posture.

On the other hand, when a patient was being treated for a fever, a large amount of blood was drawn as a therapeutic measure; to minimize the effects of this blood loss and to enable as much blood as possible to be taken before syncope intervened, the patient was bled in a recumbent posture. For Wardrop, it was not the amount of blood, but the effects of the blood loss that determined when bleeding had to stop.

Wardrop used leeching only for lacal inflammations with no systemic upset. He also utilized them for revulsion as well as for derivation, Thus, for "affectations of the head", they were placed on the feet and head alternatively. He realised that leeches probably sucked off both arterial and venous blood and that the effects of losing venous blood was not the same as losing arterial blood.

Cupping, he said, should only be usedwhen leeches caused irritation (unless, of course, counter- irritation was desirable.)

As bleeding reached its hey-day in the first half of the nineteenth century, a few cautious observers became alarmed at the disastrous effects that this indiscriminate bleeding could cause. Marshall Hall in his book entitled "Researches on the Effects of Loss of Blood", published in 1830, did much to sway general opinion away from the reckless use of bleeding.(12)

He pointed out that there were immediate and longterm effects of blood loss. The immediate effects included syncope, delirium, convulsions and coma, while the longterm effects were excessive reaction, defective reaction, general or sudden fading of the vital powers, and death. There were also organic changes such as tympanitis and effusions, but the cause for these was more obscure.

Marshall Hall propounded the theories that it was often the actual reaction to blood loss which made a patient look as though he needed more bleeding, whereas further bleeding proved erroneous and dangerous. He also

said that protracted sinking caused by blood loss, could often look like congestion of the lungs, but that the frequent re-utilization of the lancet could well be fatal.

The degree of reaction of the patient depended on his strength, so children and old people often showed no reaction, but just a gradual fading.

Hall urged the restriction of bleeding to certain diseases which both withstood bleeding well and benefitted from it, such as apoplexy, inflammation of organs and membranes, fever, irritation of the brain, chest, and abdomen. Acute anasarca (oedema of all the subcutaneous tissues) required large depletions of blood.

Hall had severe doubts concerning the usefulness of bleeding in conditions arising from loss of blood, and thought that dyspepsia and chlorosis (a type of profound anaemia) assimilated more with irritation and reaction from blood loss.

Even Wardrop admitted that bleeding had limitations, but for less scientific reasons. He considered it injurious in syphilis, cancer and gout. In gout, bleeding was only to be used to reduce pyrexia and inflammations. Then specific gout remedies should be used alone.

Largely as a consequence of Hall's views, a huge controversy arose over the uses of bleeding. This reached its heightin 1850-60, and seemed (13) to be centered on Edinburgh. Here, a young lecturer in the Medical School, by the name of John Bennett (1812-1875) had come under the influence of the new scientific attitude whilst a student under Louis on the Continent. He knew that new discoveries made with the microscope in Pathology, showed pneumonia to be a local condition of the lungs with exudation of fluid and coagulation of blood. He told his students that he seriously doubted whether a large bleeding from the arm could possibly help this local process in the lungs. For him, bleeding just lowered the vital powers and strength of the individual.

To support his views, Bennett quoted the mortality figures for pneumonia, which had declined in recent years. The popularity of bleeding had also declined in the last decade, so Bennett attributed this drop in the mortality of pneumonia to the decreased use of bleeding.

The Professor of Physic and Edinburgh was naturally outraged to hear this heresy said against all the old and revered teachers of medicine. The Professor, who was William Alison (1790-1859) replied that the new techniques of percussion and auscultation (not available to Cullen when he recommended that all pneumonias should be treated with bleeding), showed that not all pneumonias were identical, and that some types admittedly, did not respond well to bleeding. (Alison almost definately had detected the difference between lobar and broncho- pneumonia)

The real cause for this conflict was that there was confusion about inflammation. Alison regardedinflammation as a systemic febrile reaction and did not realise that the process could be local, or that there were differing degreesof it. To him, bleeding was the mainstay of the anti-phlogistic regime, and the chief remedy for inflammation.

Bennett's teacher Louis, led the fight against blood-letting but there was heavy opposition: Wardrop insisted that that an incompressible pulse could only be treated by bleeding, for example. No definite rules had been given for bleeding, but since it was found empirically to work, it had to be retained.

Bennett still insisted on describing inflammation on microscopic grounds and said that bleeding only slowed the process of removal of the exudations by reducing the patient's vital powers, Alison was not a microscopist, and thought that inflammation was a vital action and a change in the blood, rather thanan exudation. He thought bleeding could cut short the process of inflammation before the stage of exudation.

Eventually, scientific evidence converted Doctors to Bennett's way of thinking. By 1865-1875, it wasconcluded that bleeding was bad for all states and was rarely practised. Students of Medicine were not taught the techniques and bleeding was largely forgotten.

However, by the end of the the nineteenth century, interest in bleeding had revived a little, but bleeding was used discriminately, and not for specific inflammations. It was realised that loss of blood did harm, and only transiently reduced the temperature. It was also generally realised that the delirious symptoms of a patient who had been bled heavily, were due to lack of blood and not to worsening of the disease, so no more blood was drawn. (5)

By 1901. bleeding was never performedto the stage of death, but stopped immediately the patient felt faint. Patients were bled standing or sitting so that syncope was easily noticed (5)

Reasons for bleeding were based more on hydrostatic principles now, rather than on the antiphlogistic regime.Any condition causing stagnation of blood on the right side of the heart was treated by venesection . Thus chronic bronchitis,any heart disease, lobar pneumonia when it caused impedance of the pulmonary blood flow, pleurisy, and malignancy of the lung were treated. Epilepsy was still thought to benefit from bleeding, as was aortic aneurysm, but the mechanism of action was obscure.

Such well established remedies as leeching do not die an easy death, however, as is seen by active mention of these techniques in books published just after the turn of the century.Whitla in 1903 (6), is to be seen reminding Doctors of the method of leeching, with very little alteration in method

or theory from that of a century previously. Leeches were still used for local inflammationsuch as over the liver in cases of hepatitis, or over the cardiac area in pericarditis.

Whitla used venesection for extensive inflammations, and he himself observed on-e" hopeless" case of immersion which was brought back to life by rapid bleeding

Why the littl eamount of blood that leeches withdrew should have such a beneficial effect, Whitla could not explain. Again, with wet cupping, it was still used,(as in the case of acute nephritis when cups were applied over the kidneys) but Brunton observed that the same effect seemed to be obtained with dry cupping. Perhaps cupping worked by bringing blood out near the surface, or perhaps because the local stimulus had an effect on the general circulation or because the fluid passing through the tissue in the cup was somehow altered? (7)

Not surprisingly, rural areas continued to retain these traditional methods of treatment for longer than the cities; it is not too difficult to believe the reports of a patient with pneumonia in the French Alps in 1938 that he was treated with six cups applied to the back of the chest by an old herb woman!

Venesection persisted as a widespead remedy for conditions causing a congested circulation throughout the first half of the twentieth century. In 1943, Venesection was still regarded as the most important treatment for c congestive heart failure(8); 300-600ccs. were rapidly withdrawn by a large bore needle to produce rapid relief.

Bleeding was also recommended for bronchial asthma, acute pulmonary oedema, cerebral haemorrhege, cyanosis in bronchopneumonia, hypertension, polycythaemia and uraemia. It was contraindicated in anaemia and hypotension.

Nineteen years later, in 1962,a leading textbook of medicine(9) recommended venesection as a life saving measure in seizures of acute pulmonary oedema. It was also suggested for chronic cor pulmonale(if the haematocrit was over fifty), painful liver failure, and intractable heart failure although it was realised that the effects here would only be short lasting.

In 1970, leeching, scarification, cupping and arteriotomy have no place in therapeutics. Venesection remains in use only as a palliative measure in rare disorders of the blood (polycythaemia and haemochromatosis) (15)

The attitude to bleeding certainly changed during this period of three hundred years!

In the eighteenth century, the widespread uses of bleeding were based on the same old traditional and mystical beliefs as people had held for centuries before.The actual method in which the blood was withdrawn was considered to be a vital part of the treatment. The whole idea of blood-

letting was based on naive, unscientific assumptions on the workings of the human body. Little was known of disease processes, and the classification of diseased states was extremely simple- hence Cullen's hot and cold "fits", and Brown's sthenic and asthenic states.

The first half of the Nineteenth century continued to use all types of bleeding for the same reasons as before ie: general blood letting for any supposedly systemic disorder such as pneumonia, and local bleeding for any local inflammation or affectation. So strong was the belief in the beneficial actions of blood loss, that bleeding was extended to being a measure that kept people in good health. It was also sometimes used to provide counter-irritation, or repulsion: one mention was even found of its use as a means of inducing anaesthesia! Simply by removing blood from the body, leeching had a cosmetic purpose when used to treat obesity or a black eye.

During the second half of the nineteenth century, bleeding waned in popularity. This phenomenon can be attributed to several factors, the most important being the increase in man's understanding of disease processes. Once this is known, specific remedies for any understood illness are not long in following. This development of Pathology followed the emergence of Micoscopy and the Biological Sciences. Of course, a great contribution to the abandonment of indiscriminate bleeding was made by cautious scientific observers such as Marshall Hall, and also by the emergence of the scientific attitude and sophisication of thought. Even among all these radical changes in man's thinking, the magical disease, epilepsy, was still fought with bleeding.

The persistence of local methods of bleeding well into the twentieth century can be regarded as an example of the inertia and resistence to change that there is in man's mind, and also as an illustration of the appeal that simple magical remedies have.

Venesection remained so long as a common mode of palliative treatment because specific drugs were not available. Heart failure, for instance, can usually be treated well with potent diuretics which have only been developed recently. The same applies to the treatment of hypertension,

A similar situation arises in the remaining diseases that are still treated with venesection; once the basic pathology is understood, there will be no need for this ancient remedy at all.

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